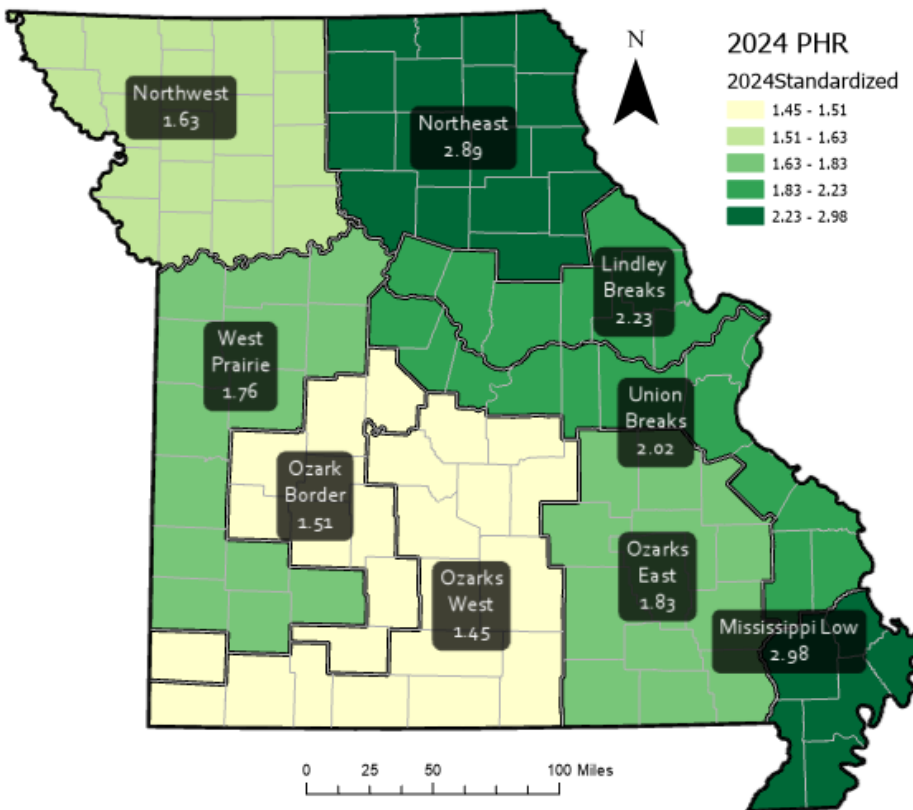# 2024 Missouri Wild Turkey Brood Survey Results

Nick Oakley – Wild Turkey Program Leader
Missouri Department of Conservation

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The Missouri Department of Conservation (MDC) has conducted a wild turkey brood survey annually since 1959. During the survey, MDC staff and citizen volunteers record turkey observations during June, July, and August to determine the success of the hatch. Data are collected at the county level and reported statewide and by Turkey Productivity Region, which are counties grouped by similar land cover composition (Figure 1).

2024 brood survey results:

In 2024, the turkey program decided to adopt the methodology that the National Wild Turkey Federation's Technical Committee developed to filter and analyze brood data — more on the differences between the approaches and what that means for brood data in MO later in this report.

Altogether in 2024, 9,216 brood observations were submitted between July and August. Of those, 1,481 were filtered, resulting in 7,735 total observations analyzed using the standardized brood survey protocol. Of the observations censored from the final analysis, 93% were removed because more than 25% of the turkeys were marked as unknown (n = 1,223) or didn't have a hen associated with the brood (n = 177).

The statewide Poult-to-Hen (or Poult-per-Hen; PPH) ratio was 1.95, compared to 1.2 poults-per-hen as calculated using the historical data

Figure 1. Regional Poult-to-Hen Ratio results using the standardized brood protocol.

filtering method (Table 1). The regions with the highest PPH were the MS Lowlands and Northeast regions using both methodologies at 2.98 and 2.89 PPH respectively (Figure 1; Table 1). The Ozark

Border and Ozarks West region had the lowest PPH at 1.45 and 1.51 respectively. You will note that PHR values from both methods identify areas with lower production and areas with higher production similarly. This is a good indication that both approaches are identifying the true trend.

Table 1. Poult-per-hen (PPH) ratios & 95% CIs, standard deviations, and sample sizes for each region and at the statewide scale.

Region	Standardized PPH	2.50%	97.50%	SE	n	PPH Historical Method
Lindley Breaks	2.23	2.04	2.43	0.1	747	1.3
MS lowlands	2.98	2.21	3.79	0.41	51	3.2
Northeast	2.89	2.68	3.09	0.11	752	2.2
Northwest	1.63	1.41	1.85	0.11	412	1.1
Ozark Border	1.51	1.31	1.71	0.1	502	0.8
Ozarks East	1.83	1.6	2.07	0.12	501	1.1
Ozarks West	1.45	1.29	1.61	0.08	811	0.8
Union Breaks	2.02	1.89	2.14	0.06	1,480	1.2
Unknown	0.99	0.72	1.27	0.14	207	NA
West Prairie	1.76	1.56	1.98	0.11	466	0.9
Statewide	1.95	1.88	2.01	0.03	5,929	1.2

Statewide production was lower in 2024 than in 2023, but higher than production we saw between 2019 and 2022. Notably, 2021 had a produciton value of 1.0 using the historical method but was 1.9 when analyzed using the standardized method. This is a larger difference than we saw in the other years that we have data from both methods. It is worth noting that in 2023 — when males born in 2021 are two-year old gobblers — we saw a large spike in harvest. It's possible that the standardized protocol did a better job of identifying the uptick in production that would have predicted that harvest jump. Or, it could be noise, we will need more time to calibrate ourselves to what the new methodology means.
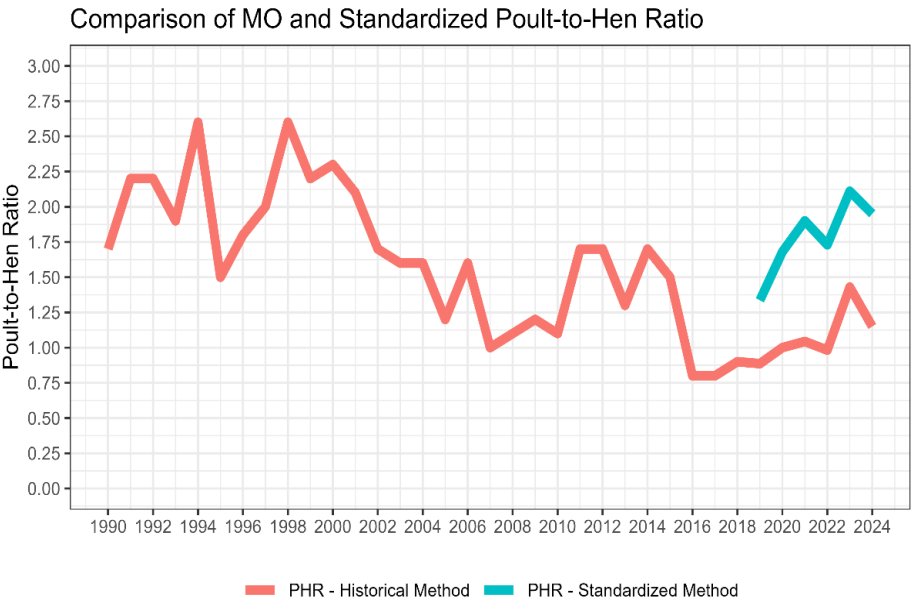

Figure 1. Poult to hen ratios since 1990 using the historical approach and 2019 using the standardized protocol at the statewide level.

Other information that the brood survey provides can be used to take the pulse the population, in addition to the poult-to-hen ratio. Poults-per-brood provides an index of poult survival. Hens observed with a brood indicates nest success and the ratio of males to females gives a measure of gobbler carryover after the spring hunting season. These three indices may not be as familiar to some as the poult-to-hen ratio because they are usually highly correlated to the PHR and usually tell the same story. Since we have the data, it is worth including for those of you who are interested. Note, the following tables are generated from data that was filtered using the standardized protocol. Further, you will note that the sample size for the varying indices (n) differs due to the data being analyzed.

Table 2. Poults-per-brood (PPB) ratios & 95% CIs, standard deviations, and sample sizes for each region and at the statewide scale.

Region	PPB	2.50%	97.50%	SE	n
Lindley Breaks	3.88	3.66	4.12	0.12	430
MS Lowlands	4.24	3.38	5.12	0.44	36
Northeast	4.41	4.22	4.63	0.11	494
Northwest	3.4	3.1	3.71	0.15	198
Ozark Border	3.4	3.15	3.66	0.13	223
Ozarks East	3.81	3.48	4.13	0.17	240
Ozarks West	3.67	3.44	3.92	0.12	319
Union Breaks	3.65	3.5	3.82	0.08	819
Unknown	3.53	3.01	4.14	0.3	58
West Prairie	3.18	2.88	3.49	0.15	259
Statewide	3.75	3.67	3.83	0.04	3,076

Table 3. Proportion of hens associated with a brood and the male to female ratio for each region and at the statewide scale.

Region	Proportion of Hens with a Brood	n	Male to Female Ratio	n
Lindley Breaks	0.55	747	0.46	905
MS Lowlands	0.76	51	0.52	68
Northeast	0.66	752	0.54	990
Northwest	0.46	412	0.54	530
Ozark Border	0.44	502	0.78	662
Ozarks East	0.47	501	0.61	633
Ozarks West	0.43	811	0.69	1,091
Union Breaks	0.54	1,480	0.62	1,905
Unknown	0.28	207	0.99	293
West Prairie	0.61	466	0.68	658
Statewide	0.52	5,929	0.63	7,735

What is new and why transition to the standardized protocol?

The turkey brood survey, much like most other wildlife surveys we do, is designed to track trends in the population. We refer to these types of data as indices. The value in an index is not in the number that is reported, rather the trend that they reveal. Said another way, a production number of 1.0 is no more meaningful than a production number of 2.0 if there is no context through which to view that number. In Missouri, the 10-year average for the turkey poult-to-hen ratio is 1.1. So, we know that a production number higher than that indicates a better hatch year and a number lower than that is worse than that long-term average. Importantly, the protocol used to collect the data needs to be the same otherwise it's impossible to compare year to year.

Many research papers have been written about what a "good" poult-to-hen ratio would look like, and 2.0 is a common value reported. However, there is no context to go along with that number. How were the data collected? Did the researcher censor any observations, and if so, why? What time of year are you collecting production data? In other words, are the methods those researchers used the same as the methods we use in Missouri? The short answer is no, we have done things our own way since 1959. Meaning, the production numbers you have seen in previous versions of this report can't be compared between states. They are only good to show the trend in production in MO; that seems like a missed opportunity.

The good news is that in 2019, members of the National Wild Turkey Federation (NWTF) Technical Committee came together to develop a standardized brood survey protocol. A few states like Missouri had been doing a brood survey for decades while others were just getting their brood survey off the ground. By standardizing the way data are collected and how they are censored between states, brood data can now be used to compare production across states.

What does that mean for Missouri?

This gives Missouri a chance to update our protocol to better match what most other states are doing. Below are a list of the differences between Missouri's historical brood survey design and the standardized brood survey. In each case below, Missouri's traditional approach would **not** have censored these observations whereas the new approach will.

- Observations in which ≥ 25% of the turkeys were marked as unidentified or unknown
- Observations of ≥8 hens with 0 poults
- Observations of poults with 0 hens
- Observations of ≥1 poult and ≥1 hen in which the ratio of poults to hens is ≥16 (or hens to poults is ≤0.0625)
- Observations of turkeys believed to have been recorded before
- Observations outside of the 1 July - 31 August survey window
  - Missouri's brood survey has run from 1 June to 31 August. However, the technical committee was concerned that young poults are difficult to see due to their small size and an adequate sample size could be obtained by limiting the survey to two months.

The data filtering steps above were developed to ensure that the data submitted were of the highest quality. For example, a flock of birds in August with more than 8 hens and no poults is certainly possible, but it's also likely that some of those birds are poults. So, that observation would get censored. Similarly, if more than 25% of the turkeys observed weren't identified, it's hard to guess if they were hens, poults, or gobblers, so that observation would not be included in the final calculations.

One more filtering step that we have historically done in Missouri is to remove brood observations with more than two hens. This was an early attempt at ensuring quality data when the brood survey was initiated in 1959. At that time, many counties in MO did not have any turkeys, and when populations were reestablished in those counties, it was unlikely that a brood of, for example, 3 hens and 15 poults would be seen. By censoring these data, biologists back then were hoping to get the most accurate production numbers possible. Obviously, times have changed, and this censoring step is no longer biologically justifiable and will not be a part of the standardized filtering process.

How does this impact the production number?

So far, the new standardized protocol has shown consistently higher poult-to-hen ratios (Figure 3). Remember though, an index is only valuable as a tool to illustrate a trend, and the trend lines match up well, the new approach just reports larger poult-to-hen ratios. With that said, it's fair to wonder why we'd go through the process of switching methods. The improvement to the biological soundness of the methods along with the benefit of being able to compare Missouri's production directly to other states outweigh the short-term inconvenience of learning how to interpret a new production number. For the foreseeable future, the turkey program will continue to publish both poult-to-hen number to ensure that the trends are indeed matching even though the annual numbers will be different